SCREENING OF COFFEA ARABICA CULTIVARS FOR THE BIOTECHNOLOGICAL EXTRACTION OF HYDROXYCINNAMIC ACIDS

Luis V. Rodríguez-Durán[1], Ma. Ascensión Ramírez-Coronel[1], Ernesto Favela-Torres[1], Cristóbal Aguilar-González[2], & Gerardo Saucedo-Castañeda[2]*
1. Universidad Autónoma Metropolitana (UAM-I). Department of Biotechnology, Av. San Rafael Atlixco 186, Vicentina 09340, D.F. Mexico. E-mail: saucedo@xanum.uam.mx
2. Universidad Autónoma de Coahuila. Department of Food Science and Technology

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Introduction. Coffee pulp (CP) is the main solid byproduct of wet processing of coffee cherries and it represents about 40-42% by weight of the fruit. CP is currently under-utilized and in some cases discarded without treatment, therefore it could represent a serious environmental problem (1). One of the most promising alternatives for the utilization of CP is the extraction of high-value compounds present in this material, such as hydroxycinnamic acids (HCAs). It was found that these phenolic acids are mainly esterified to the cell wall polysaccharides, and it was proposed an enzymatic treatment to extract these compounds (2). However, subsequent studies indicated that the amount and distribution of HCAs may differ radically from a CP cultivar to another (3).
Therefore, in this work we studied the content of free and esterified HCAs present in the pulp of coffee from 7 cultivar of *Coffea arabica*, to find out a proper raw material for the enzymatic extraction of HCAs.

Methods. Coffee cherries from 7 cultivars of mature (red) *C. arabica* were collected from a plantation in the municipality of Xico, Veracruz. Fruits were pulped in a manual pulper and air dried. Dry CP was milled and sieved at a particle size of 0.15-0.84 mm. A sample of 2 g of CP were placed into Erlenmeyer flasks and subjected to an extraction process comprising three successive extractions with 20 mL of hexane at 30°C, followed by 3 extractions with aqueous methanol 80 % at 55°C. The extracts obtained with hexane were discarded, whereas the methanol extracts were collected and analyzed for free HCAs. Solid residue was subjected to alkaline hydrolysis with 2M NaOH in the presence of ascorbic acid (1%) and EDTA (10 mM), for 2 h at 40°C. The hydrolyzate was filtered and analyzed for esterified HCAs. HCAs were analyzed by HPLC.

Results. Figure 1 shows that Red Garnica and Mundo Novo cultivars have the highest HCAs content, followed by Typica and Costa Rica. It was found that HCAs are present mainly in the free form for all the cases analyzed. Table 1 indicates that CGA is the most abundant HCA, accounting for 72-82% of total HCAs. Although Garnica cultivar presents the highest content of HCAs, it represents a small fraction of total coffee cultivated. The variety Typica is the most cultivated in the state of Veracruz.

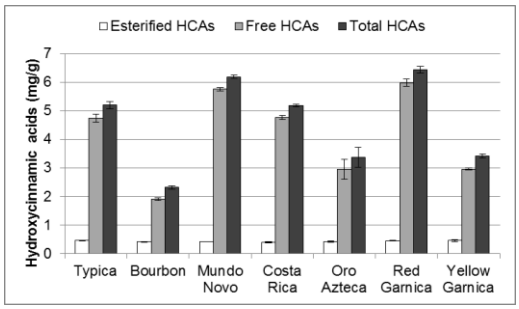

Fig.1 Free and esterified HCAs content of coffee pulp from 7 varieties of *C. arabica* (dry basis)

Table 1. Relative concentration of single HCAs in coffee pulp from 7 varieties of *C. arabica* (%)

Variety	CGA	CA	FA	pCA
Typica	78.2	19.1	2.6	0.1
Bourbon	79.6	15.4	4.7	0.3
Mundo Novo	81.8	15.3	2.7	0.1
Costa Rica	79.9	16.3	3.4	0.4
Oro Azteca	72.1	23.3	4.0	0.6
Red Garnica	79.8	17.2	2.7	0.3
Yellow Garnica	73.2	22.8	3.4	0.6

*CGA=Chlorogenic acid, CA=Caffeic acid, FA=Ferulic acid, pCA=p-Coumaric acid; C.V.=1-14%

Conclusions. In this work we found that CP from *C. arabica* var Typica could be a good source for the biotechnological production of HCAs such as CGA and CA.

References.

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